A003/WBS 1.4

Department of Energy
Brookhaven Group
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Upton, New York 11973

JUN 08 2000

6/13/00
J. Porter
G. Mecomm

Mr. Michael Schlender
Brookhaven Science Associates, LLC
Brookhaven National Laboratory
Upton, New York 11973

Dear Mr. Schlender:

SUBJECT: APPROVAL OF UNREVIEWED SAFETY ISSUE DETERMINATION/ SAFETY EVALUATION (USID/SE) FOR THE ABOVE GROUND DUCT REMOVAL FOR BROOKHAVEN RESEARCH REACTOR DECOMMISSIONING PROJECT (BGRR-SE-99-04)

The Brookhaven Group (BHG) has reviewed your request to begin removal of the BGRR Above Ground Duct. BHG has determined that the actions referenced in USID/SE BGRR-SE-99-04 (Rev.0) comply with the requirements of DOE Order 5480.21, Unreviewed Safety Questions and DOE-EM-STD-5503-94, EM Health and Safety Plan Guidelines. Therefore, removal of the BGRR Above Ground Duct is authorized.

If you have any questions regarding this matter, please contact Gail Penny of my staff at extension 3429.

Sincerely,

George J. Malosh
Brookhaven Group Manager

cc: M. Holland, BHG
S. Mallette, BHG
G. Penny, BHG
M. Dikeakos, BHG

Environmental Management Directorate

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May 31, 2000

Mr. Michael D. Holland
Director, Project Management Division
U.S. Department of Energy
Building 464
Upton, NY 11973

SUBJECT: Unreviewed Safety Issue Determination/Safety Evaluation (USID/SE) for Above Ground Duct Removal for BGRR Decommissioning Project

Dear Mr. Holland:

Enclosed for your review and approval is the subject document (BGRR-SE-99-04, Rev. 0, dated 05/25/00), covering WBS 1.4 – Above Ground Duct Removal. This document reflects the incorporation of the DOE comments discussed at the comment resolution meeting of May 23, 2000, and has already been submitted informally to the DOE Project Manager for the BGRR Decommissioning Project to expedite the review and approval process. Physical removal cannot begin until DOE approval is received.

If you have any questions regarding the contents or analysis of BGRR-SE-99-04, please call Steven Moss (ext. 7639) or Stephen Pulsford (ext. 2394).

Sincerely,

Michael Schlender

Michael Schlender
Assistant Laboratory Director
Environmental Management

Enclosure: BGRR-SE-99-04, Rev. 0 (as amended)
cc (w/o enclosure):
M. Cowell, BU
F. Crescenzo, DOE/BHG
R. Desmarais, DOE/BHG
M. Dikeakos, DOE/BHG
S. Layendecker, RCD
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E. Martinez, DOE/BHG
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S. Moss, BGRR
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C. Newson, BGRR
S. Pulsford, BGRR
T. Sheridan, DO
File WBS 1.4

cc: (w/enclosure)
G. Penny, DOE/BHG

Safety Evaluation Number: **BGRR – SE – 99 – 04** **Revision Number:** 0

Prepared by: S. H. Moss SHMoss 5/25/00 **Date:** 05/25/00

Description of proposed activity: WBS 1.4, Above Ground Duct Removal

The above ground primary air cooling ductwork is part of the pile primary air cooling system. Pile cooling air was ducted towards the top of the fan house building 704, where the north and south air plenums join to form a common header over the fan house. The common header ducted the air to the intake of five fans. The fans discharged air into an underground duct that carried the air to the main stack. The internal surfaces of the ductwork are contaminated.

The ductwork will be removed in approximately twelve (12) large sections. The heaviest piece will be approximately 170,000 pounds. The ductwork has five joints on the roof of the Fan House that may be used to section five pieces of the ductwork for removal. The north and south duct venturis and the convergence piece require cutting, which will create three pieces of ductwork. Two small pieces and two large pieces of ductwork may be removed at their respective joints. Each section may be separated from its adjacent duct section by mechanical cutting of its expansion joint. (See Attachment 2 – URS / Dames & Moore Technical Work Documents for AGD Removal Activities for; a detailed description of how cuts are to be made, containment methodologies to be employed, and size limitations on pieces for transport offsite for disposal.)

Radiological samples will be taken of the interior surfaces of the ductwork to determine the type and amounts of contamination present. A fixative will be used on any interior surfaces that exhibit loose surface radiological contamination. The openings will be capped and sealed to prevent the spread of contamination. The duct work sections will be removed using a crane. A heavy-hauler truck will transport the sections to a designated staging area for additional cutting if required, package preparation, and transport to off-site disposal. (See Attachment 1 – URS / Dames & Moore Safety, Health and Emergency Response Plan for AGD Removal Activities for a detailed description of how hazards associated with work to be done will be mitigated.)

The activities proposed here include:

1) Sample and perform in-situ evaluation of the interior of the duct work.
2) Apply a fixative to the interior surfaces of the duct work.
3) Perform diamond wire cuts of the concrete.
4) Cap and seal all openings.
5) Disassemble the first joint above the Fan House.
6) Cap and seal the ends.
7) Using a crane, remove the section and place on a heavy hauler, using staging areas adjacent to Bldg 704.
8) Transport and unload the piece at the designated staging area in the East/West Parking Lot(s).
9) Cut the piece for shipment and off-site disposal.
10) Package, characterize, and ship the pieces for off-site disposal using truck service.
11) Repeat the steps for the remaining straight sections of duct work.
12) Shore the "Y" section of the ducting.
13) Cut the section at the designated location.
14) Using a crane, remove the pieces.
15) Package, characterize, and ship the pieces for off-site disposal using truck service.
16) Prepare activity closure report.

Purpose:

The purpose of WBS 1.4 for the BGRR Decommissioning Project is Removal of Above Ground Duct. It specifically consists of: removing all the above ground primary air cooling duct work from the first joint above the ground eastward over the top of building 704 to reduce the "skyline" of the BGRR Complex and address a portion of sub-Area of Concern 9B of the IAG between DOE, EPA and NYSDEC.

References:

(1) Procedure No. ERD-OPM-4.4, "Safety Evaluations for Unreviewed Safety Issue Determinations", Rev.0 dated 1/18/00.
(2) BGRR-002, "Hazard Classification and Auditable Safety Analysis for Brookhaven Graphite Research Reactor (BGRR) Decommissioning Project", Rev. 2 dated September 8, 1999, as approved by DOE 11/18/99.
(3) BGRR-001, "Brookhaven Graphite Research Reactor (BGRR) Project Management Plan", Rev. 1 dated March 2, 2000.

(4) BNL ES&H Manual Standard 1.3.3, "Safety Analysis Reports / Safety Assessment Documents", Rev.1 dated 7/28/92. [URL= https:sbms.bnl.gov/ld/ld08/ld08d081.htm]
(5) DOE-STD-1027-92, "Hazard Categorization and Accident Analysis Techniques for Compliance with DOE order 5480.23, Nuclear Safety Analysis Reports" Change Notice No. 1 dated September 1997.
(6) LA-12846-MS, "Specific Activities and DOE-STD-1027-92 Hazard Category 2 Thresholds", LANL Fact Sheet issued November 1994.
(7) LA-12981-MS, "Table of DOE-STD-1027-92 Hazard Category 3 Threshold Quantities for the ICRP-30 List of 757 Radionuclides", LANL Fact Sheet issued August 1995.
(8) BNL Memorandum of Agreement (MOA) between BGRR Project Office and HFBR regarding ownership and control of Fan House Building 704 and Associated Equipment, Systems and Structures, dated 12/11/98.
(9) BNL Action Memorandum for Brookhaven Graphite Research Reactor Above Grade Ducting Removal Action dated 11/17/99.
(10) URS/Dames & Moore Safety, Health and Emergency Response Plan for Removal of Above Ground Ducts at the Brookhaven Graphite Research Reactor. (Copy included as Attachment No. 1)
(11) BGRR Management Directive: Building 701 Emergency Reporting Form dated 10/20/98, "Small Pieces of Contaminated Concrete Falling from Aboveground Duct".
(12) DOE ORPS Report CH-BH-BNL-BNL-1998-0032, "Discovery of Contaminated Material Outside a Rad. Controlled Area", Status Final dated 11/24/98.
(13) BGRR-SE-99-01, Removal of Pile Fan #5 for BGRR-DP, as approved by DOE 10/26/99.
(14) BGRR-SE-99-03, Removal of Residual Pile Fans for BGRR-DP, as approved by DOE 12/08/99.
(15) DOE Letter dated December 7, 1999, from G. Malosh to J. Lister of NYSDEC and M. Logan of USEPA, "Transmittal of the Above Ground Duct Removal Action Memorandum for the Brookhaven Graphite Research Reactor Decommissioning Project (BGRR-DP)".
(16) URS/Dames & Moore technical work documents for Above Ground Duct Removal Activities, including; "Duct Cutting and Segmentation Plan, Heavy Lifts and Rigging Plan.,(copies included as Attachment No. 2), Waste Management Plan .
(17) NUREG/CR-0672, "Technology, Safety and Costs of Decommissioning a Reference Boiling Water Reactor Power Station", June 1980.
(18) Long Island Power Authority – Shoreham Nuclear Power Station – NRC Docket No. 50-322, "Updated Decommissioning Plan", February 1993.
(19) Brookhaven Graphite Research Reactor Decommissioning Project Health and Safety Plan (HASP)-BGRR-0006, dated September, 1999.
(20) BNL FFA under CERCLA Section 120, February 28, 1999 [IAG between U.S. EPA – Region II, U.S. DOE and NYSDEC].

SCREENING CRITERIA

Safety Function(s) of Systems Affected

1. Will the proposed activity affect the safety function(s) or failure mode(s) of the equipment/facility? Y (N) N/A

Because of its defunct status and defueled state, the BGRR has no current requirements for redundant systems and/or safety class or safety significant SSCs (Systems, Structures and Components). Therefore, no safety functions exist that are directly associated with current components or equipment considered part of the scope of the BGRR Decommissioning Project. Where no safety functions exist, there can be NO effect on the safety function by the proposed activity.

The Above Ground Ducts were shutdown as part of the general BGRR shutdown in 1969. It may already be considered as having failed [Refs. 11, 12].

The proposed activity will not affect the safety function(s) of the facility [as there are none]; it will not affect the failure mode(s) of the equipment/facility, as the equipment was previously and permanently shutdown. The answer to Question 1 of Safety Function(s) of System Affected is '**NO**'.

2. Will any new failure modes be introduced by the proposed activity? (Y) N N/A

BGRR-002, "Hazard Classification and Auditable Safety Analysis for the BGRR Decommissioning Project", Rev. 2 dated September 8, 1999 [Ref. 2], was approved by DOE on 11/18/99. It specifically excludes from review or consideration the impact of contamination removal activities directly associated with the decommissioning process. Guidance for the selection of appropriate failure modes to consider was taken from other decommissioning projects [Refs. 17 & 18]. The failure modes

selected and associated accident analyses presented in Appendix A are; Crane Load Drop, Waste Container Drop, Contaminated Waste Bag Rupture/Fire, Contamination Control Envelope Rupture, and Vacuum Filter Bag Rupture.

The URS/Dames & Moore Safety, Health and Emergency Response Plan for the Above Ground Duct Removal [Ref. 10] and the URS/Dames & Moore technical work documents for Above Ground Duct Removal [Ref. 16], do not preclude the use of any of the above listed equipment. Therefore, none of the accident scenarios listed above can be discounted at face value. Based on the physical characteristics of the materials to be removed (concrete, metal sheeting and rebar), Combustible Waste Fire was deemed not a credible accident scenario.

In the presence of the BGRR-ASA, the proposed activity represents a new activity, with its own unique spectrum of potential failure modes. Specifically within the BGRR-ASA, the proposed activity (CERCLA Time-Critical Removal Action) represents an activity not covered by the BGRR-ASA (per Table 1.1 – ASA Applicability Table of Section 1.4 – Scope of Work).

As the proposed activity is specifically defined as being outside the scope of the BGRR-ASA and consists of deconstruction and remediation activities to be performed as part of a CERCLA Time Critical Removal Action, it may well introduce new failure modes not previously considered under the BGRR-ASA. The answer to Question 2 of the Safety Function(s) of System Affected is '**YES**'.

Effects on Safety

1. Could the proposed activity increase the probability of occurrence of an accident previously evaluated in the ABD? Y (N) N/A

For the Brookhaven Graphite Research Reactor Decommissioning Project, the authorization basis documents include; the BGRR-ASA (which was approved by DOE 11/18/99), the DOE Safety Evaluation Report as approved 10/27/99, the BGRR-DP Quality Assurance Program Plan, BGRR-DP Health and Safety Plan, and DOE-approved USID/SEs. Of those documents, only the BGRR-ASA contains original accident analysis data (the DOE-SER reiterates and amplifies on the contents of the ASA, but includes no new accident scenarios nor changes to the ones in the BGRR-ASA).

Even though the BGRR-ASA accident analysis excludes actual D&D work-related accidents; it must still be reviewed for the potential impact of the proposed activity on the probability of occurrences for the accident scenarios contained within the BGRR-ASA. Because of the "Routine Risk" nature of the defueled BGRR (classified as a "Radiological Facility"), a rigorous probabilistic risk assessment was not required as part of the Auditable Safety Analysis. Instead, using a graded approach and the guidance offered in BNL ES&H Standard 1.3.3, {https:sbms.bnl.gov/ld/ld08/ld08d081.htm}[Ref. 4], the Risk Assessment Tables of Section 3.2 of the BGRR-ASA were developed.

Among the events analyzed in BGRR-ASA Section 3.2 – Risk Assessment are; Seismic Event, High Winds, Graphite Dust Detonation, Loss of Pile Negative Pressure System Ventilation, Loss of Pile Negative Pressure System Filtration, Crane Load Drop, Fire, Facility Worker Exposure to Toxic Material.

The proposed activity has no capability to impact the probability of occurrence of Seismic Events or High Winds (which are natural phenomena). Additionally, as the proposed activity is limited to the removal of the Above Ground Duct; it has no potential to impact the probability of events occurring at other local buildings e.g., Buildings 701 & 702. This eliminates from further consideration; Graphite Dust Detonation, Loss of Pile Negative Pressure System Ventilation, Loss of Pile Negative Pressure System Filtration, and Building 701 Crane Load Drop. The only remaining accident scenarios from the BGRR-ASA to be considered are: Risk Assessment No. 007, covering Fire; and Risk Assessment No. 008, covering Facility Workers Exposure to Toxic / Hazardous Materials.

The proposed activity involves the exposure by cutting and removal of contaminated concrete, steel liners and potentially contaminated insulation/coating(s). There are no significant amounts of combustible materials involved and only mechanical means will be used for separation. The accident analysis of the proposed activity in Appendix A includes an accident scenario which already and independently address the potential for initiation of fire. This event is Contaminated Waste Bag Rupture / Fire. The proposed activity, having its own fire probability assessment, represents no increase in the probability of fire as defined in BGRR-ASA Risk Assessment No.7.

Finally, as 'Potential Initiators' under Risk Assessment No. 008 covering Facility Worker Exposure to Toxic/Hazardous Materials are; natural phenomenon, operator error, or equipment failure causing breach of deactivated piping or equipment containing residual hazardous/toxic material. The only BGRR-DP workers or Sub-contractor workers are those directly

involved in the decommissioning process, including the performance of the proposed activity. Therefore, the proposed activity does not increase the probability of occurrence of this event. It merely reflects one of the potential initiators of this event. The proposed activity represents no increase in the probability of occurrence of the event as defined in BGRR-ASA Risk Assessment No. 008.

So the answer to Question 1 of 'Effects on Safety' is '**NO**'.

The proposed activity does not increase the probability of any accident evaluated in the Authorization Basis Documentation.

2. Could the proposed activity increase the probability of occurrence of a malfunction of equipment, systems, or components that are Important-to-Safety? Y (N) N/A

As was already discussed in response to Screening Criterion No. 1 under 'Safety Function(s) of Systems Affected'; the BGRR has no current requirements for redundant systems and/or safety class or safety significant SSCs (Systems, Structures and Components) due to its defunct status and defueled state. Therefore, no safety functions exist that are directly associated with the proposed activity covered by this USID/SE. Without equipment, systems or components that are Important-to-Safety, there can be no probability of occurrence of a malfunction of equipment, systems or components that are Important-to-Safety; nor any increase in same.

The proposed activity **COULD NOT** increase the probability of occurrence of a malfunction of equipment, systems or components that are Important-to-Safety.

3. Could the proposed activity create the possibility of an accident of a different type than those previously evaluated in the ABD? (Y) N N/A

As already discussed in the response to Screening Criterion No. 2 under 'Safety Function(s) of Systems Affected', the answer to this question is 'YES'. However, the consequences of any such accident , as discussed in Appendix A are bounded under the consequences of accidents presented in the BGRR-ASA, based upon a comparison of maximum projected release.

4. Could the proposed activity create the possibility of an equipment, system, or component malfunction of a different type than those previously evaluated in the ABD? (Y) N N/A

As already discussed in the response to Screening Criterion No. 2 under 'Safety Function(s) of Systems Affected', the answer to this question is 'YES'. However, the consequences of any such malfunction , as discussed in Appendix A are bounded under the consequences of accidents presented in the BGRR-ASA.

5. Does the proposed activity reduce the Margin-of-Safety as defined in the basis for any ABD? Y (N) N/A

In ERD-OPM-4.4 [Ref. 1], the procedure states "In the context of this procedure a Margin-of-Safety is reduced if the Safety Limit or Limiting Condition of Operation or Administrative Control as defined in the Authorization Basis Document(s) is violated". As this safety evaluation is based upon the guidance provided in the above referenced procedure, that definition of Margin-of-Safety compels the answer 'NO'.

The proposed activity DOES NOT reduce the Margin-of-Safety as defined in the BGRR-ASA because the work is being reviewed under the USI process prior to authorization and will not violate any of the Administrative Controls already contained in the BGRR-ASA as long as the work is performed as described in the task specific technical work documents [Refs. 9, 10, 15, 16 and 19]

Authorization Basis Document(s) Changes

1. Is a change to the facility ABD(s) being made? (Y) N N/A

The BGRR-ASA refers to the performance of work outside the scope of the ASA as requiring the use of the USI process as defined in ERD-OPM-4.4 [Ref. 1]. The proposed activity covered here specifically falls under that classification (see ASA Table 1.1 – ASA Applicability Table, for CERCLA Removal Actions). The completed and approved USID/SE for the proposed activity should be considered as an addendum and amendment to the BGRR-ASA.

Therefore, it does constitute a change to the BGRR-ASA and requires the approval of the DOE Project Manager for the BGRR Decommissioning Project, prior to implementation. The answer to Question 1 under 'Authorization Basis Document(s) Changes' is 'YES'.

SAFETY EVALUATION CONCLUSION

Based on the evaluation of the evidence cited above, the issue --

_____ Does NOT constitute an Unreviewed Safety Issue.

__√__ Does constitute an Unreviewed Safety Issue.

**** IF ANY OF THE ABOVE ARE <u>YES</u>, THEN A USI EXISTS. ****

Clyde T. Hansen 5/25/00
BGRR Project Engineer Signature/ Date

Stephen V. Mirolins 5/25/00
BGRR Project ES&H Manager Signature/ Date

5/25/00
BGRR Project Manager Signature/ Date

5-25-00
BGRR Project QA Representative Signature/ Date